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EXERCISE CONTROL AND FEEDBACK CHALLENGES FOR THE DIGITIZED BATTLEFIELD

At platoon and company level, digitization pushes trainers out of the unit's information loop. Bringing trainers back into the loop risks overwhelming them with exercise data. Trainers at battalion level and above are in the staff's information loop but challenged by data collection and processing requirements.

Trainers for unit exercises serve both exercise control and feedback functions. The exercise control function includes playing the role of higher, adjacent, and supporting units by sending and receiving messages. The feedback function includes identifying key tactical communications and illustrating their relevance to other exercise events during after action review (AAR) sessions. Battlefield digitization makes it difficult to perform these functions, and the challenges facing trainers differ between company level or below and battalion level and above exercises.

Digitization involves a lower and higher tactical internet (TI). The higher level TI systems encompass a mixture of digital systems at battalion level and above supporting staff decisions in a tactical operations center environment. The lower TI uses the Force XXI Battle Command Brigade and Below (FBCB2) system to allow individual vehicles or soldiers to exchange data (including friendly position location data enabled by global positioning systems) with one another and with the systems of the higher TI. The lower TI supports communications at platoon and company level.

Lower TI Challenges

At platoon and company level, battlefield digitization pushes the trainer out of the tactical information loop. Voice communications have traditionally enabled trainers at platoon and company level to monitor multiple radio nets at the same time, keeping track of the information flow within a unit and between a unit and its higher, adjacent, and supporting units. The trainer could also use the radio to send and receive messages relevant to control roles, such as a trainer playing the role of a higher headquarters. The move to visually based messages addressed to specific recipients over computer networks pushes lower level trainers out of the tactical information loop. Tracking three radio nets in the digital world leaves trainers with the impossible task

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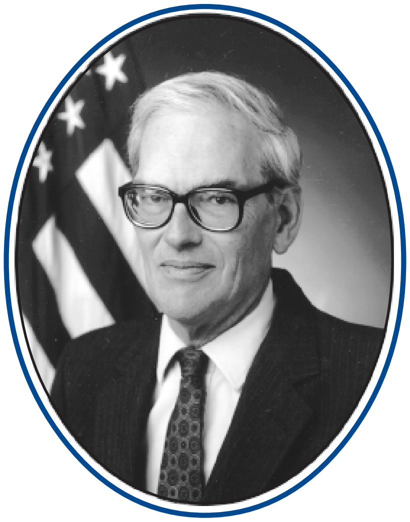

Director's Message

Technological advances may produce unanticipated side effects that are detrimental to mission success; this issue's lead article is a case in point. The wealth of information made available through digitization threatens to either neglect or overwhelm those in the traditional role of trainer for unit exercises. However, other technology tools can reverse this threat and restore the trainer's vital role in exercise control and feedback.

The benefits of state-of-the-art digitization to individual training is illustrated by the article on intelligent tutors that interact with and adapt to individual trainees. Another case of technology supporting adaptation to individual needs is distance learning. These resources represent increased flexibility and efficiency.

The attention to technology does not reduce the importance of more "traditional" concerns, however. We are still very much in the business of developing tools to select and promote the right individuals in order to get optimal results, as illustrated by the articles on the Assessment of Individual Motivation (AIM) and NCO promotion criteria. Optimizing NCO performance is, in turn, dependent on proper structuring of Army jobs; this is discussed in the article on the Enlisted Common Soldier Task Survey Project.

The ARI program continues to strike a balance between demands of emerging technologies and the needs of the soldier.

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of interacting with three computers. As a result we can have situations where, for example, a unit receives revised graphic control measures and mission orders without the trainer being aware of this change.

ARI and the Army Simulation, Training and Instrumentation Command (STRICOM) sponsored a Small Business Innovation Research (SBIR) Phase II project with the objective of developing a C4I Training Analysis and Feedback System (CTAFS) to help trainers perform exercise control and feedback functions for digital exercises at company team level and below in the virtual environment. The system employs automation, artificial intelligence and innovative database design techniques to help trainers monitor the flow of tactical information across multiple nets, play control roles (up to six at a time), and employ automatically generated AAR aids illustrating key digital communications events. The CTAFS brings the trainer back into the unit's tactical information loop by giving the trainer continual access to the complete database of sent and received messages for key unit members. Figure 1 illustrates the trainer's access to the Company/Team (Co/Tm) Commander's Received Messages Database. In this case, the trainer selects received messages from the database, chooses reports and opens a received Contact Report from the 1st Platoon Leader. After viewing the report, the trainer has the capability to add this digital message to the AAR as a key teaching point.

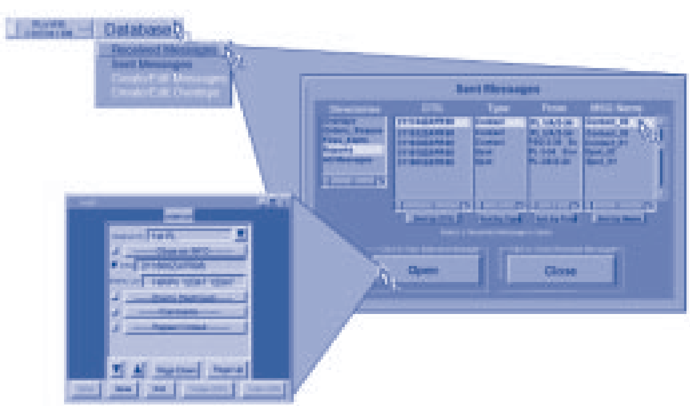

Figure 1. Complete and rapid trainer access to digital data in each exercise players' sent and received database (used with permission of Advancia Corporation).

In addition to providing the trainer with instant access to all of the monitored node's messages, designers are expanding CTAFS functionality to provide the trainer with automated "Alerts" identifying important digital actions or inactions. CTAFS will provide information management utilities for analyzing the digital data stream and a storage bin for AAR aids that the trainer will use to cover digital training points at the end of the exercise. The training points addressed by the automatically generated aids were derived in part from lessons learned by the ARI Armored Forces Research Unit regarding the Force XXI digital training experience.

Figure 2 illustrates a potential CTAFS trainer alert for identifying discrepancies between the situational awareness of exercise participants. CTAFS will use various exercise events to trigger automatic database scrubs. In this example, CTAFS identifies that the Co/Tm Commander sent an updated Operations Overlay to all key members of the Co/Tm except for the 3rd Platoon Leader. CTAFS activates a trainer alert for this event and enables the trainer to quickly view the Co/Tm Commander's updated overlay and the 3rd Platoon Leader's most recent Operations overlay. CTAFS enables the trainer to quickly look at these discrepancies and determine if he should add these alerts and map displays as AAR aids.

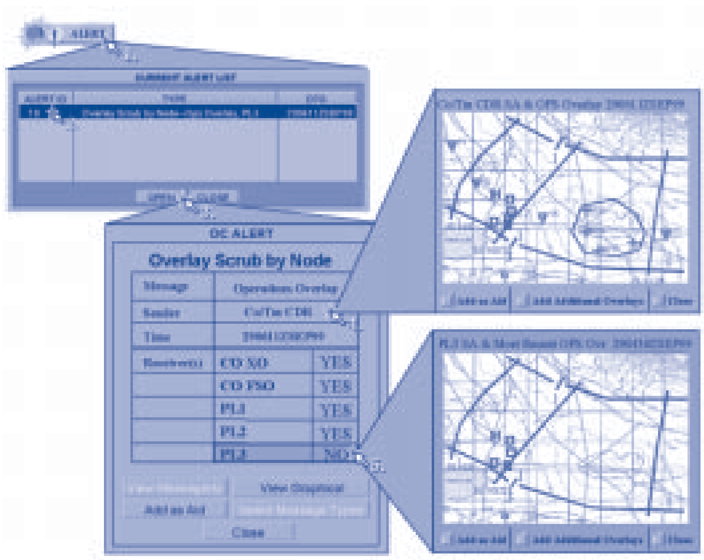

Figure 2. CTAFS automatically alerts the trainer to differences in situational awareness (used with permission of Advancia Corporation).

CTAFS works in the background and monitors all digital traffic. It automates database searching and uses its embedded expert system to reduce the trainer's workload. For example, the trainer does not have to switch to each exercise participant's database, open each received message, and look for differences in situational awareness or procedural errors. CTAFS performs this type of mundane work so the trainer can stay focused on the overall exercise. In addition, CTAFS alerts the trainer to important events and generates automated AAR aids. With these capabilities, CTAFS enables the trainer to focus on coaching and mentoring.

The CTAFS does not integrate the digital data with other data that trainers need to control exercises and provide feedback, such as ground truth data (i.e., an enemy force with these characteristics is at this location) and voice radio communications. Future efforts to support platoon and company level trainers must include the capability to integrate digital data with these other sources of information. They must also provide trainers with information regarding user interactions with digital systems (e.g., did the company commander read the contact report?).

Upper TI Challenges

Trainers at battalion level and above are within the staff tactical information loop. They can look over the shoulder of the operators of the Maneuver Control System (MCS), All Source Analysis System (ASAS), Advanced Field Artillery Tactical Data System (AFATDS), and other systems on the higher TI to observe what messages are sent, what messages are received, and what decision aids are being employed. Trainers can use operational digital systems to perform control functions.

The higher TI presents challenges in terms of providing units with feedback. The user of the information provided by the higher TI systems is often someone other than the operator. Staff trainers must track the flow of information passed from the operators of digital systems to the users of digital information (e.g., are there cases where tactically significant digital information is not being passed from the system operator to decision makers?) and they must also monitor what decision makers are doing with the passed information. This imposes a spatially large and complex observation requirement on trainers. Observing operators for extended periods of time is personnel intensive, and the Army would benefit from automated tools that help monitor the flow of communications and operator interactions with digital systems. Staff trainers, like platoon and company trainers would benefit from automated tools that support the preparation of AAR aids relevant to digital training points.

At the request of the Army Training Support Center Army Training Modernization Directorate, ARI identified capabilities that exercise control and feedback systems would need to support digital exercises through battalion task force level. This work was accomplished by reviewing emerging digital doctrine from platoon through battalion task force level to identify a sample of 42 digital training points applying to FBCB2, MCS, ASAS, and/or AFATDS. ARI then designed information displays that would help a trainer monitor unit performance with respect to these training points (see Figure 3). They then reviewed the 42 displays to define the system needed to create these displays.

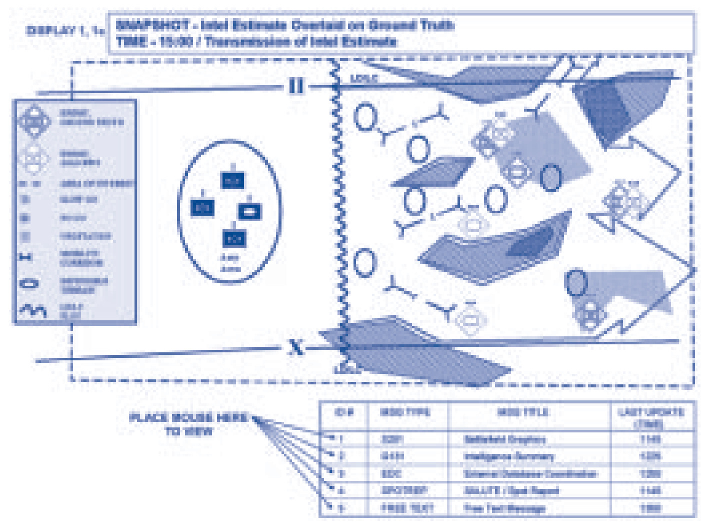

Figure 3. Display allowing trainers to compare the intelligence estimate of the enemy situation with ground truth.

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THE GOAL FOR DIGITIZED INTELLIGENT TUTORS

The Army is always striving to do more, faster and better, with fewer personnel. This applies to training as well as operations. One approach to this mission is the use of advanced technology based on research. Intelligent tutors may be able to play a significant role in Army training if they can be made cost-effective.

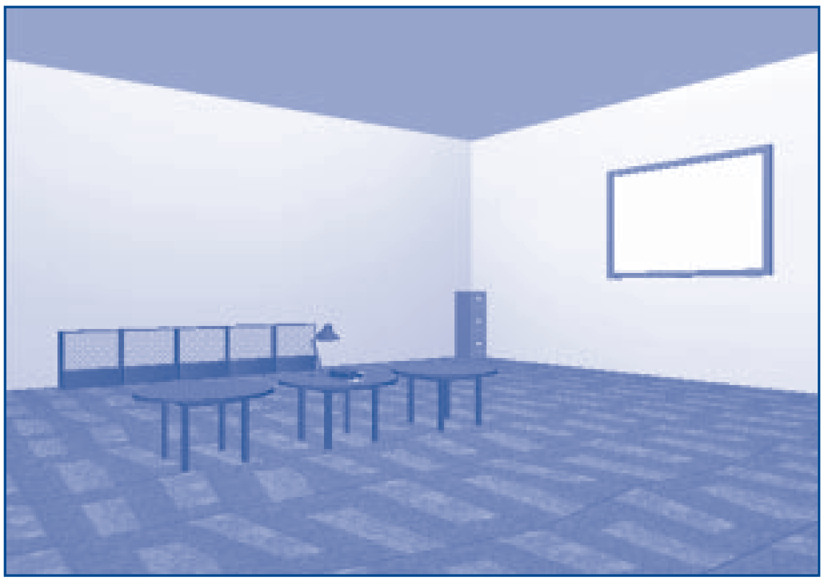
In typical computer based instruction, the computer presents existing, instructional material in a fixed order; the trainee learns the material, and then is tested. This has the advantage of being easy to do, but the problem of not being able to maximize training effectiveness by tailoring itself to individual trainee's performance, nor by being able to hold the trainee's interest over time. Advanced computer-based instruction attempts to solve these problems through the use of intelligent tutors.

The phrase "intelligent tutor" is used to describe some form of computer-based instruction that interacts with and adapts to individual trainees during a lesson. Interactivity describes the type of interchange that takes place between the trainee and the tutor. The typical type of intelligent tutor interactivity is to present material to be learned and then ask questions about that material. The trainee answers the questions, and based on those answers, the tutor engages in some kind of adaptation. However, other forms of interactivity are possible. The tutor can answer questions from the trainee taking the role of a domain expert. The tutor can engage the trainee in a kind of dialogue in which it and the trainee can both ask and answer each other's questions. This is called mixed initiative dialogue. The tutor can behave like another person with whom the trainee has to interact and allow practice. The material can be presented as part of a game-like microworld which holds the trainee's interest and increases practice time. In all these cases, an intelligent tutor should be able to adjust to the trainee's performance strengths and weaknesses. Such adaptation takes place on one of two levels—the ability to alter the sequence of presenting existing instructional material or dialogue and the ability actually to create new material or dialogue.

The good thing about intelligent tutors of various sorts is that by adapting to trainees and holding their interest, they are able to increase learning. The bad thing about them is that they are difficult and time consuming to program for a given training application since they require artificial intelligence programming techniques. Typically, this means that individual training applications have to be bought and any changes in material to be trained require a new, expensive application to be built over a considerable period of time. This is undesirable in a period of training cost constraints and with a military force that is likely to have to learn new and unforeseen material. Unfortunately, no existing training authoring system targeted at instructors has been able to develop such intelligent tutors.

ARI has worked in this area for a number of years, and completed a prototype system, the Military Language Tutor (MILT). It and its corresponding system, the Global Language Authoring System (GLAS), which was developed jointly with other government agencies using MILT technology, has been delivered to the U.S. Army Special Operations Forces and the U.S. Military Academy. This system allows instructors to build their own lessons and the rules that control the interactive sequencing of training materials. It also contains a microworld in which instructors can create game-like virtual environment exercises to teach material. It makes use of continuous speech recognition, natural language processing, and authorable Boolean sequence branching. This system was designed for instructors with no computer science background to be able to learn within four hours using a built-in help function and a built-in tutorial. MILT/GLAS can sequence existing lesson material based on trainee performance, but they cannot generate new material—the ultimate goal of intelligent tutoring.

ARI is currently working on a project to develop authorable systems that can generate new material on their own as a function of interaction with trainees—The Intelligent Dialog Tutor and Conversational Agents Program. This project provides intelligent tutor agents for individualized instruction. The agents provide instruction, ask questions, and gives hints & prompts. In this mode, the tutor provides instruction that adapts to individual trainees. It evaluates trainee answers, diagnoses inadequacies & misconceptions and gives specific feedback. Then it presents the next most logical instruction based on trainee performance. The tutor's interactivity strategies are based on student and instructor models. The student model represents how well each topic has been learned so far. The instructional model incrementally plans the topic sequencing. It chooses the next topic based on the student model and the curriculum information links. The tutor also provides conversational agents for skill practice in job realistic environments. These conversational agents converse about any facts and concepts authored into their belief system. They can be used as practice partners and as simulated individuals in training scenarios and mission rehearsals.



The tutor incorporates authorable knowledge bases, natural language understanding and generation, dialog management, continuous speech recognition and speech synthesis. At pedagogically appropriate moments, the system can produce multimedia displays. The tutor system is designed to be fully authorable by non-programmers to enable instruction and dialog for any domain. Non-delivery programmers can also create new simulated characters from scratch and add or modify their knowledge and conversational personality. For example, one can create simulated commanders, subordinates, indigenous people, opposing forces. The tutor system will be capable of in stand-alone mode or over the Internet. This ability is likely to be important for distributed learning environments. The ability of instructors to create new dialogues is a technical breakthrough which should result in the ability of the Army to develop cost-effective artificially intelligent tutor lessons.

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Soldiers' Access to Distance Learning Training

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In recent years, a desire to cut training costs while increasing accessibility has led to an escalating interest on the part of academia, industry, and the military in shifting training from the traditional face-to-face classroom setting to a distance learning format. The Army has an ambitious plan to convert over 500 courses to distance learning, delivering training to soldiers when needed. As described in the Total Army Distance Learning Plan, soldiers in the 21st Century will attend streamlined resident courses, preparing themselves through diagnostic-driven, self-paced distance learning modules delivered at home station in unit learning centers, at the job site, or in their residences.

Delivering training to the job site or to a soldier's residence depends, of course, on having the right technology in place. The Sample Survey of Military Personnel (SSMP), a semi-annual survey conducted by the Army Personnel Survey Office of the U.S. Army Research Institute for the Behavioral and Social Sciences, recently began collecting information on computer availability among active duty personnel. The survey conducted in the Fall of 1998 asked a random sample of soldiers and officers whether they have access to personal computers (PCs) at home or at work and further explored the characteristics of their home computers, including access to the Internet.

The population for the SSMP is all permanent Active Component Army personnel, excluding those who are unavailable at the time the survey is administered because they are in training courses, hospitalized, or enroute to new assignments. This population is sampled randomly on the basis of the last 1 or 2 digits of the individuals' Social Security Numbers (SSNs). For officers, everyone with a particular final digit is selected, yielding a sample that is 10% of the population. For enlisted personnel, three pairs of digits are chosen; everyone with an SSN ending in one of these pairs of digits is selected, yielding a sample that is 3% of the population. The survey is administered by a Personnel Survey Control Officer at each installation or, in Europe and Korea, by direct mail. The survey completion rate is roughly 50% for both officers and enlisted, so that the final samples of responses comprise about 5% of the officer population and 1.5% of the enlisted population. Minor adjustments in weighting are made in the results, so that the contributions of different ranks, gender, and location in the sample match those in the total Army.

Out of 5,139 enlisted personnel, 63% reported having access to a PC at home, at work, or in the classroom; 42% reported having a PC at home. These figures compare favorably with results for similar questions (45% "PC used at home or work in past month" and 39% "have PC at home") asked on surveys administered to a representative sample of Americans (n=1,990) for Roper Reports in February 1999.

Out of 4,705 officers, 96% reported having access to a PC at home, at work, or in the classroom; 84% reported having a PC at home. Although the rate of PC ownership for officers is twice that for enlisted personnel, questions about the capabilities of those home PCs showed that the computers owned by the two groups were nearly identical. Large majorities of the PCs owned by both groups had color monitors (>90%), Windows 95 or 98 software (>85%), speeds of 100MHz or faster (>80%), and hard drives with 1GB or more of memory (>80%). Of special importance for distance learning, more than 75% of the PCs owned by both officer and enlisted personnel were connected to the Internet.

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21st Century NCOs

The U.S. Army is undertaking fundamental changes to prepare to meet the missions of the 21st century. Through such initiatives as Force XXI, Strike Force, and the Army of 2010 and beyond, the Army is working hard to capture and integrate to full advantage emerging technologies, organizational structures, and operating procedures. However, Army leadership recognizes first and foremost the importance of its people to force effectiveness. In this regard, the Army is diligently seeking to insure its readiness for future operations through soldier and unit training, leader development, and the preparedness of soldier systems. ARI's research on 21st Century NCOs reflects the Army's concern with soldiers.

The purpose of 21st Century NCOs is to provide a foundation for promotion decisions for an NCO corps that has the capabilities needed for successful performance in the early part of the 21st century—the period from 2000 to 2010. The research seeks to provide this foundation by projecting the personal attributes and experiences that are likely most important for performance of the future jobs held by NCOs. The research team will then seek to validate this projection by linking the identified attributes and experiences to measures of future job performance and potential.

The focus on future jobs challenged application of the scientific methodologies traditionally used in selection and assignment research. Selection and assignment research is traditionally grounded on descriptions of actual job performance obtained through such methods as surveys of job incumbents and observations of work samples. Scientists and job analysts then typically apply accepted theories of human behavior to specify the attributes and experiences that enable successful performance of the described jobs. Finally, the validity of these specifications is tested using measures of actual job performance. The focus on jobs that do not actually exist made it necessary to modify existing methods in order to project attributes and experiences and to assess the correctness of those projections.

ARI recently projected the attributes and experiences needed for future jobs. The research team started with the Army's vision of the future. With this vision as the framework, the research team reviewed Army documents, administered surveys, and conducted interviews to construct a comprehensive picture of current jobs, the factors likely producing changes in future jobs, and the likely nature of job changes. Surveys and interviews elicited the forecasts of individuals with expertise and experience in a number of different domains. These domains included force development, the Army's Force XXI initiatives, and education and other specialties in human behavior and its development. Expertise from multiple domains was sought for several reasons. The varying perspectives of multiple domains enhanced the chances of constructing a comprehensive picture of the uncertain future. Use of multiple perspectives also allowed use of "convergence" as a basis for increasing certainty about future projection. That is, confidence was greater for the changes that were expressed in the forecasts of multiple

individuals with expertise in different domains. Using these procedures, job descriptions were developed for NCOs at each of three levels: junior (E-5), mid-level (E-6 and E-7), and senior (E-8 and E-9).

The research team analyzed the job descriptions to make decisions about the types of skills, aptitudes, and other personal characteristics that would enable future NCOs in performing effectively. The researchers again relied on judgment convergence to finalize and prioritize the importance of the attributes for future performance. Two groups participated in the prioritization. One group consisted of senior commissioned and non-commissioned officers. The senior leaders first reviewed the list of projected attributes and added attributes that the group members thought necessary. Group members then reached consensus about the relative importance of the attributes. The second group was composed of researchers with backgrounds in personnel measurement, development etc. This group used the list from the earlier group and reached consensus on relative importance. Based on these procedures, the best bet of the future consists of the attributes agreed upon by the two groups.

What were the attributes judged important for future NCO performance? Table 1 presents a sample of the attributes reviewed by the two panels. It shows the attributes about which the groups had greatest agreement for each of the three levels of NCOs. Table 1 is organized to show, for the high consensus attributes, where there were overlaps and differences for the three NCO levels.

The table below projects that the future job performance of NCOs at all three levels will require a common set of attributes. This set contains personal attributes that might enable good performance by careerists in many organizations: strong cognitive aptitude and characteristically high levels of integrity and discipline. The common set also includes skills in oral communication and decision-making. The common set includes motivating and leading others, likely to be especially defining for Army jobs.

Differences across the levels of NCO suggest at least one important pattern. For junior-level NCOs, personal attributes were especially characteristic, for example high levels of effort, initiative, and need to achieve. Such attributes would likely enable new NCOs in developing and performing advanced job requirements. More of the attributes for mid-level and senior-level NCOs seem to be related to their roles as leaders of others and of organizations. For mid-level NCOs, these attributes included the supervision of others' performance and training them for that performance. Attributes unique to senior-level NCOs reflected organizational matters—quality of life and knowledge of Army systems and their relationships. Writing skills also received priority ratings for senior NCOs.

These projections will be used to determine the set of attributes for measurement. Afterward, the measures will be validated against job performance. As mentioned earlier, validation poses the challenge of how to measure the performance of jobs that do not yet exist. Developing a response to this challenge is a major component of upcoming phases of this work.

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KSA	Jr.	Mid	Sr.
General cognitive Aptitude	X	X	X
Characteristic Level of Integrity and Discipline	X	X	X
Judgment and Decision Making Skill	X	X	X
Oral Communication Skill	X	X	X
Motivating and Leading Others	X	X	X
Conscientiousness/Dependability	X	X	
MOS/Occupation-Specific Knowledge and Skill	X	X	
Characteristic Level of Effort and Initiative	X		X
Need to Achieve and General Energy Level	X		X
Directing, Monitoring, and Supervising Others		X	X
Training Others		X	
Adaptability			X
Concern for Soldier Quality of Life			X
Knowledge of System Inter-Relations			X
Writing Skill			X

New Test To Predict Attrition

Assessment of Individual Motivation (AIM)

Recent findings on a new test of job-related motivation can enhance the Army's selection system. The history of this new measure begins in the 1980s with research showing the importance of motivational attributes in the prediction of first-term attrition and duty performance. Preliminary findings from the AIM research program have been encouraging, and a plan has now been made to use AIM for pre-enlistment screening.

Before the AIM Test:

In the 1980's, the Army developed a self-report measure of motivational attributes called the Assessment of Background and Life Experiences (ABLE). It was shown to forecast first-term attrition and duty performance. Importantly, ABLE was shown to provide unique information about an individual's motivation which is not captured in the Army's current personnel screening system.

These results generated much interest, but ABLE was never used for pre-enlistment screening due to concern about its susceptability to faking and coaching. It allowed respondents to raise their scores by presenting themselves as better than they really are; that is, faking "good." Later ARI research eventually confirmed that high levels of score inflation that result from faking do indeed undermine the effectiveness (i.e., validity) of ABLE for predicting attrition and duty performance. For this reason, the operational use of ABLE in Army pre-enlistment screening is no longer being considered.

Development of AIM: 1993 - 1997

In response to this limitation, ARI recently developed a new faking-resistant measure of ABLE attributes. This measure is called the Assessment of Individual Motivation (AIM). AIM is a self-report, paper-and-pencil test that requires 30 minutes to administer. It reliably measures examinees' dependability, adjustment, dominance, achievement orientation, agreeableness and physical conditioning.

The development of AIM began in 1993, and the prototype instrument was completed in 1996. Between FY94 and FY96, a trial version of AIM was administered to over 5,000 receptees at Fort Jackson and Fort Leonard Wood. As with ABLE, recruits with low AIM scores were shown to be at high risk for failing to complete initial entry training. In addition, those scoring high (as compared to low) on the AIM reported greater confidence in their ability to adjust to military life and perform well in the Army. Those with higher AIM scores also reported more satisfaction with their decision to join the Army, and greater commitment to serve and complete their obligated term of service.

In July 1997 ARI presented its AIM research to an external panel of testing experts who were asked to evaluate AIM's potential as an Army pre-enlistment screening measure. Consistent with the panel's suggestion, ARI proposed an AIM pre-implementation research program.

AIM Pre-Implementation Research Program: 1998 - Present

Under the sponsorship of LTG Vollrath, former Deputy Chief of Staff for Personnel, ARI began its AIM Pre-Implementation Research Program in 1998. The primary goal of this effort is to establish whether the operational use of AIM for managing attrition would be viable for the Army. This critical assessment would require the testing of many more Army recruits on AIM than have been tested prior to this program. From September 1998 - May 1999 Army recruits were tested on AIM on an ongoing basis at all six Army Reception Battalions. Over 25,000 Regular Army soldiers were tested during this period. These soldiers are now being tracked to determine their 3-, 6-, and 9-month attrition status. This will enable the Army to assess how well AIM predicts first-term attrition.

AIM Midcourse Assessment. In February - March of 1999, ARI reached the Mid-Course Assessment phase of its AIM Pre-Implementation Research program. A careful scientific review of the initial findings was conducted by a 5-member AIM Technical Review Panel. The panel recommended that the Army proceed with further AIM testing.

Preliminary Findings are Encouraging. At the time of the meeting of the Technical Review Panel, 3-month attrition data were available for over 8,000 soldier trainees who were tested on AIM in September-October 1998. By linking trainees' test scores to their attrition status, it becomes possible to assess how well AIM scores relate to early attrition. This relationship is shown in Figure 1; trainees are rank ordered on the AIM scores according to deciles. For example, those falling in the lowest 10% on AIM are assigned to decile 1, while those scoring among the highest 10% on AIM are assigned to decile 10. As shown in the chart, AIM scores are clearly related to trainee attrition, with those in the lowest decile having an attrition rate that is more than 3 times greater than those in the highest decile (22% vs 6%). Clearly, those with low AIM scores are at the highest attrition risk.

As a part of the AIM mid-course assessment, we also examined AIM's relationship with trainee attrition among a larger sample of airmen who were tested (at the beginning of Basic Military Training) in FY98. The relationship between AIM and 3-, 6-, and 9-month attrition in this Air Force sample was very similar to the one depicted for our Army sample, shown in Figure 1. In addition, the Army and Air Force findings with AIM are highly consistent with past ARI research conducted using the ABLE. Since AIM was developed to measure the same job-related attributes as ABLE, we would expect AIM and ABLE to perform in a similar manner.

Our preliminary findings also suggest that unlike ABLE, AIM is highly resistant to faking. Very little score escalation was observed when subjects in a faking experiment were encouraged to raise their scores on AIM.

Current Status of the AIM Pre-Implementation Research Program

Since the scientific review of the mid-course findings in February 1999, ARI has provided AIM update briefings to MG Timothy Maude, Director, Manpower and Personnel Management, LTG David Ohle, Deputy Chief of Staff for Personnel, and Mr. Patrick Henry, Assistant Secretary of the Army for Manpower and Reserve Affairs. The Army leadership directed ARI to continue the AIM pre-implementation research program, which continued through December 1999. The Department of Defense has also shown interest in the Army's AIM research effort as indicated by the recent requests for ARI to brief the Defense Advisory Committee on Military Personnel Testing, Vice Admiral Patricia Tracey, Deputy Assistant Secretary of Defense, and the Military Accession Policy Working Group.

As a result of these encouraging findings, the Army leadership has decided to implement AIM as one component of a new experimental pilot program for expanding the recruiting market. Candidates for the program will be tested on AIM at selected Military Entrance Processing Stations (MEPS) through September 30, 2003. Those accepted under this new recruiting initiative will be sponsored to complete an attendance-based General Education Development (GED) program while serving in the Army's Delayed Entry Program. This new experimental program, "GED Plus— the Army's High School Completion Program," was publicly announced and initiated on February 3, 2000. At that time, Secretary of the Army Louis Caldera, Army Chief of Staff Gen. Eric Shinseki, Sergeant Major of the Army Robert Hall, Secretary of Education Richard Riley, and General Colin Powell all spoke in support of the program. The program was also praised by the American Council on Education

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The Enlisted Common Soldier Task Survey Project

Background and Introduction

Just as the Army must modernize its weapon systems to take advantage of the ever-changing technology in today's world, survey administration and technology must also change in order to keep up with the needs of today's fast paced Army. The Army's Occupational Analysis Program was the first within the Department of Defense to conduct, on an operational basis, automated surveys and the first to conduct Windows-based automated surveys.

As an example of one of the automated survey projects the Occupational Analysis Office has been engaged in over the past few years, this article will give a brief overview of the Enlisted Common Soldier Task Survey Project which began in September 1997, and was completed in December 1998. The U.S. Army Sergeants Major Academy (USASMA) and the U.S. Army Training and Doctrine Command (TRADOC) recognized the need for a study that would lead to the revision of courses currently being taught in the Army's Non-Commissioned Officer Education System (NCOES). USASMA requested ARI to conduct such a study to ascertain which common soldier tasks are used, when should these tasks be taught, and if any of these tasks should be changed or eliminated. Input on additional common tasks being performed in field units was also solicited.

Study Methodology

The mission statement given to ARI from USASMA was "to validate and realign an Enlisted Common Soldier Task List, and to facilitate the development of a life-cycle training model to support the Army's Future Leader Development." In addition, there was the need to "get input from Muddy Boot Soldiers" to ensure information validity. It was important to get this information from soldiers who were actually performing these tasks in field units instead of relying on information from soldiers who were not assigned to units with a wartime mission.

Task List Development and Validation

USASMA representatives collected task lists from all of the Army proponents who were responsible for common task training development. Once the task descriptions and topic areas were identified, Subject Matter Experts (SMEs) were asked to: (1) review each topic area as well as all of the task statements grouped beneath it; (2) identify those tasks performed by soldiers across Military Occupational Specialties (MOS) (common tasks); (3) identify those tasks that were unique to a particular MOS (non-common tasks); (4) identify the skill levels actually performing the tasks; (5) identify any common tasks that were not on the lists; and (6) to revise topic areas and task statements as necessary.

Survey Technology

The development of computer-based surveys was selected for this project because they reduced the amount of time required to answer the survey in the field, and there was a need for fast and accurate turnaround of survey results. The requirements for a computer-based survey program for this project included the following:

- administer a task list of nearly 900 task items;
- display only "appropriate" task items to each respondent based on a complex combination of skill level, position (First Sergeant (1SG) or Battle Staff Non-Commissioned Officer (BSNCO)) or pay grade (Master Sergeant (MSG) or Sergeant Major (SGM));
- permit soldiers to rate the "importance" of each topic area and then present task items under each topic in order of importance; and
- accept write-in comments from soldiers both for missing tasks and for general comments.

Automated Survey Development and Administration

Two types of computer-based surveys were developed to aid in the collection of information about common tasks performed by soldiers. The first was called the Enlisted Common Soldier Task Survey, and the second was called the Training Emphasis Survey. Both surveys contained background information such as name, grade, skill level, military occupational specialty, and years of service.

The Enlisted Common Soldier Task Survey was designed to determine, for each of the skill levels, which of the common soldier tasks were being performed and obtain estimates of how often they were being done. It also collected estimates of how often soldiers performed those tasks. The SMEs rated tasks most appropriate for initial training according to skill levels. Those tasks were then presented to soldiers within that skill level and to soldiers in skill levels immediately above and below the specified skill level whenever appropriate. Tasks specified for First Sergeant were presented to Sergeants First Class based on information received during the task validation phase, "that many Sergeants First Class were performing First Sergeant duties." By presenting tasks this way, it became clear whether or not task performance had migrated to other skill levels.

There were 19,600 surveys distributed across the Army components, with instructions specifying which grades and skill levels of soldiers were being requested to participate in the survey. Soldiers were asked to provide some general background information and to select topics corresponding to duties they performed. Tasks previously clustered beneath those topics were then displayed. From these lists, soldiers were asked to identify all of the tasks they performed as well as how often they performed those tasks. Space was provided for soldiers to make comments and to identify any tasks they performed which they believed should be included as a common task, but which did not appear on the survey.

The Training Emphasis Survey was designed to gather information from supervisors (Sergeant through Company Commander) as to their opinion when training should occur for each of the tasks and the amount of emphasis that should be placed on training the task in the course selected. The goal is to make sure soldiers are trained before they are assigned responsibility for performing these tasks. There were 2,700 surveys sent to the same units where soldiers who responded to the Enlisted Common Soldier Task Survey indicated they were assigned for duty. Instructions were included requesting that commissioned and non-commissioned officers who were supervising personnel with the grades and skill levels of respondents to the first survey rate the importance of training for each task soldiers had identified as being performed.

Results

Of the 19,600 surveys (disks) distributed across the components (Active, National Guard, and Reserve) to soldiers with the rank of Private to Sergeant Major, 7,689 disks were returned. Of the 7,689 disks returned, there were 6,682 usable cases. The return rate of surveys by component (percentage of usable diskettes returned) was as follows: Active Duty 67%, National Guard 24%, and Reserves 27%. The number of returned surveys by Skill Level (SL) were as follows: SL1 (1,540); SL2 (1,426); SL3 (1,382); SL4 (1,431); and SL5 (903).

Further analysis of survey responses confirmed that performance of some tasks had migrated from higher to lower grades and skill levels. This confirms the fact that enlisted soldiers are not just doing the tasks spelled out in Army manuals for their particular grade, but they are routinely performing critical common tasks at the next higher grade level above their current rank and formal training.

Conclusions

Respondents were asked to complete a short set of evaluation questions at the end of the survey. The results indicated that the majority of respondents found it easy to schedule a computer to complete the survey (86%), felt the instructions were easy to understand (79%), and preferred the computer-based survey process to paper and pencil (61%). A majority of respondents (51%) took 60 minutes or less to complete the survey, and a majority (53%) felt the time to complete the survey was reasonable.

This survey project was highly successful in terms of technological innovations and the collection of information that was actually used in the Task Selection Board convened at the USASMA in January 1999. Decisions were made which moved some of the tasks to training programs at an earlier point in one's enlisted career, which was a major objective of this project.

In April 1999, TRADOC approved the changes made to the task lists, and these revised lists were then sent to the Army proponents for task analysis (where required). Once this has been completed, it will be necessary to update the common core courses taught in Basic Combat Training or One Station Unit Training through the Advanced Non-Commissioned Officer Courses. The ultimate goal or outcome of this project is to institutionalize this process on a regular basis (every three years) to avoid task lists becoming outdated which results in soldiers not receiving the proper training at the right times during their career. It is anticipated that this process will be repeated in 2001.

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